

B<sup>1</sup>  
contacting said hydrogen gas which contains carbon monoxide with a catalyst for a water gas shift reaction said catalyst comprising at least platinum and rhenium, both supported on a metal oxide carrier.

---

B<sup>2</sup>  
10. (Thrice Amended) The method according to claim 9, wherein said metal oxide carrier is selected from the group consisting of zirconia, alumina, titania, silica-magnesia, zeolite, magnesia, niobium oxide, zinc oxide and chromium oxide.

---

B<sup>3</sup>  
11. (Amended) A fuel cell generation system, comprising:  
a hydrogen gas which contains carbon monoxide in contact with a catalyst for a water gas shift reaction comprising at least platinum and rhenium, both supported on a metal oxide carrier so as to remove carbon monoxide from the hydrogen gas, which is supplied to a fuel cell.

---

B<sup>4</sup>  
12. (Thrice Amended) The fuel cell generation system according to claim 11, wherein said metal oxide is at least one metal oxide selected from the group consisting of zirconia, alumina, titania, silica, silica-magnesia, zeolite, magnesia, niobium oxide, zinc oxide and chromium oxide.

---

B<sup>5</sup>  
13. (Amended) The method for removing carbon monoxide according to Claim 9, wherein an amount of said platinum is from 0.1% to 10% by weight based on a weight of the metal oxide carrier.

---

B<sup>6</sup>  
15. (Amended) The method according to Claim 9, wherein an amount of said rhenium is from 0.1 % to 10 % by weight based on a weight of the metal oxide carrier.

16. (Amended) The method according to Claim 9, wherein said catalyst further comprises at least one metal selected from the group consisting of yttrium, calcium,

chromium, samarium, cerium, tungsten, neodymium, praseodymium, magnesium, molybdenum and lanthanum supported on said metal oxide carrier.

17. (Amended) The method according to claim 16, wherein an amount of said metal is from 0.1 % to 10 % by weight based on a weight of said metal oxide carrier.

18. (Amended) The method according to claim 9, wherein said catalyst has been subjected to water treatment at 80 to 100°C.

19. (Amended) The fuel cell generation system according to claim 11, wherein an amount of said platinum is from 0.1% to 10% by weight based on a weight of the metal oxide carrier.

---

21. (Amended) The fuel cell generation system according to claim 11, wherein an amount of said rhenium is from 0.1 % to 10 % by weight based on a weight of said metal oxide carrier.

22. (Amended) The fuel cell generation system according to claim 11, wherein said catalyst further comprises at least one metal selected from the group consisting of yttrium, calcium, chromium, samarium, cerium, tungsten, neodymium, praseodymium, magnesium, molybdenum and lanthanum supported on said metal oxide carrier.

23. (Amended) The fuel cell generation system according to claim 22, wherein an amount of said metal is from 0.1 % to 10 % by weight based on a weight of the metal oxide carrier.

24. (Amended) The fuel cell generation system according to claim 11, wherein said catalyst has been subjected to water treatment at 80 to 100°C.

---

Please add the following new Claims.

26. (New) A carbon monoxide removing unit which contains a catalyst for a water gas shift reaction comprising at least platinum and rhenium, both supported on a metal oxide carrier,

wherein said catalyst is capable of contacting a hydrogen gas having an initial carbon monoxide concentration, thereby producing a hydrogen gas having a reduced carbon monoxide concentration compared to said initial carbon monoxide concentration.

27. (New) The carbon monoxide removing unit according to claim 26, wherein an amount of said platinum is from 0.1% to 10% by weight based on a weight of the metal oxide carrier.

28. (New) The carbon monoxide removing unit according to claim 26, wherein an amount of said rhenium is from 0.1 % to 10 % by weight based on a weight of the metal oxide carrier.

29. (New) The carbon monoxide removing unit according to claim 26, wherein said catalyst further comprises at least one metal selected from the group consisting of yttrium, calcium, chromium, samarium, cerium, tungsten, neodymium, praseodymium, magnesium, molybdenum and lanthanum supported on said metal oxide carrier.

30. (New) The carbon monoxide removing unit according to claim 29, wherein an amount of said metal is from 0.1 % to 10 % by weight based on a weight of said metal oxide carrier.

31. (New) The method according to Claim 9, wherein a carbon monoxide concentration of said hydrogen gas after contacting said catalyst is not larger than 1%.

32. (New) The fuel cell generation system according to Claim 11, wherein a carbon monoxide concentration of said hydrogen gas which is supplied to said fuel cell is not larger than 1%.

33. (New) The carbon monoxide removing unit according to claim 26, wherein a carbon monoxide concentration of said hydrogen gas after contacting said catalyst is not larger than 1%.

---

#### **BASIS FOR THE AMENDMENT**

Claims 1-8, 14, 20 and 25 have been canceled.

Claims 9 and 11 have been amended as supported at page 5, lines 9-14 of the specification. The remaining Claims have been amended to better conform to accepted U.S. practice.

New Claims 26-33 have been added.

New Claim 26 is supported at page 1, first full paragraph and page 10, first full paragraph.

New Claims 27-30 are supported by Claims 1-25 as originally filed. New Claims 31-33 are supported at page 3, lines 9 and 10.

No new matter is believed to have been added by entry of this amendment. Entry and favorable reconsideration are respectfully requested.

Upon entry of this amendment Claims 9-13, 15-19, 21-24 and 26-33 will now be active in this application.

#### **INTERVIEW SUMMARY**

Applicants wish to thank Examiner Langel for his helpful and courteous discussion with Applicants' Representative on March 9, 2003. During this discussion it was noted the Examiner may consider Claim 9 more favorably if amended to include the presence of rhenium.

## **REQUEST FOR RECONSIDERATION**

Applicants respectfully request reconsideration of the application, as amended, in view of the following remarks.

**Claims 9, 11 and 26 are independent Claims.**

Claims 10, 13, 15-18 and 31 depend directly or indirectly on Claim 9.

Claims 12, 19-24 and 32 depend directly or indirectly on Claim 11.

Claims 27-30 and 33 depend on Claim 26.

The present invention as set forth in **amended Claim 9** relates to a method for removing carbon monoxide from a hydrogen gas, comprising:

contacting said hydrogen gas which contains carbon monoxide with a catalyst for a water gas shift reaction said **catalyst comprising at least platinum and rhenium**, both supported on a metal oxide carrier.

Ou et al fail to disclose or suggest the removal of carbon monoxide from a hydrogen gas using a catalyst comprising platinum and rhenium.

Ou et al disclose a process for the separation and removal of hydrogen alone or together with carbon monoxide, if present, from a mixture of these gases with reactive unsaturated hydrocarbons by contacting the mixture with oxygen over a catalyst at conditions sufficient to oxidize the hydrogen to form water while suppressing the reactive, unsaturated hydrocarbons (Ou et al, abstract). The removal of carbon monoxide by reaction with water (water gas-shift reaction) is disclosed at col. 1, lines 65-col. 5, line 5. Catalysts suitable for the second reaction zone are disclosed at col. 6, lines 46-65. They include one or more metals or metal oxides of Groups IB, IIB, IIIB, IVB, VB, VIB, VIIB and VIII and the elements of copper and zinc supported on inert porous supports. Selected removal of CO is further described, for example, in Example 1 at col. 7, lines 49 and 50. However, there is no

disclosure or suggestion to use the claimed catalyst for the CO removal. Col. 6, lines 46-50 only gives a laundry list of possible elements for the catalyst material. But there is no suggestion or motivation to combine platinum with rhenium. Ou et al exemplify only a platinum-on-alumina catalyst (Example 1, col. 7, line 18). However, Ou et al do not exemplify the specific combination of platinum and rhenium in the catalyst. Thus, Claim 9 is not anticipated by or obvious over Ou et al.

The present invention as set forth in **amended Claim 11** relates to a fuel cell generation system, comprising:

a hydrogen gas which contains carbon monoxide in contact with a **catalyst** for a water gas shift reaction **comprising at least platinum and rhenium**, both supported on a metal oxide carrier so as to remove carbon monoxide from the hydrogen gas, which is supplied to a fuel cell.

Ou et al fail to disclose or suggest the a fuel cell generation system comprising a catalyst comprising platinum and rhenium as claimed. Thus, Claim 11 is not anticipated by or obvious over Ou et al.

The present invention as set forth in **new Claim 26** relates to a carbon monoxide removing unit which contains a **catalyst** for a water gas shift reaction **comprising at least platinum and rhenium**, both supported on a metal oxide carrier,

**wherein said catalyst is capable of contacting a hydrogen gas having an initial carbon monoxide concentration, thereby producing a hydrogen gas having a reduced carbon monoxide concentration compared to said initial carbon monoxide concentration.**

Ou et al fail to disclose or suggest the a carbon monoxide removing unit comprising a catalyst comprising platinum and rhenium as claimed. In addition, this reference fails to

disclose or suggest a catalyst that is capable of contacting a hydrogen gas having an initial carbon monoxide concentration, thereby **producing a hydrogen gas having a reduced carbon monoxide concentration compared to said initial carbon monoxide concentration.** Thus, Claim 26 is not anticipated by or obvious over Ou et al.

Therefore, the rejection of Claims 9-24 under 35 U.S.C. §103(a) over Ou et al is believed to be unsustainable as the present invention is neither anticipated nor obvious and withdrawal of this rejection is respectfully requested.

In addition, the rejection of Claims 9-12, 18 and 24 under 35 U.S.C. §102(b) as anticipated by or, in the alternative, under 35 U.S.C. §103(a) as obvious over Lywood et al and the rejection of Claims 13, 16, 17, 19, 22 and 23 under 35 U.S.C. §103(a) over Lywood et al is respectfully traversed.

Lywood et al fails to disclose or suggest 1) a method for removing carbon monoxide from a hydrogen gas as claimed in Claim 9, 2) a fuel cell generation system as claimed in Claim 11 and 3) a carbon monoxide removing unit as claimed in Claim 26, each having a catalyst comprising combination of platinum and rhenium.

Lywood et al disclose a process for increasing the hydrogen content and decreasing the carbon monoxide to carbon dioxide ratio by leading a gas stream of hydrogen, carbon monoxide, and steam over an iron-free catalyst to catalyze a shift reaction. The catalysts include metals such as platinum or palladium, or mixtures thereof (Lywood et al, col. 3, line 56-col. 4, line 5). In addition, the reference teaches away from using a mixture of platinum and rhenium because it discloses that catalysts that are free of metals of Group VII of the Periodic Table work particularly well for their shift reaction (Lywood et al, col. 4, lines 45-50). Thus, Claims 9, 11 and 26 are not anticipated by or obvious over Lywood et al.

Therefore, the rejection of Claims 9-12, 18 and 24 under 35 U.S.C. §102(b) as anticipated by or, in the alternative, under 35 U.S.C. §103(a) as obvious over Lywood et al and the rejection of Claims 13, 16, 17, 19, 22 and 23 under 35 U.S.C. §103(a) over Lywood et al is believed to be unsustainable as the present invention is neither anticipated nor obvious and withdrawal of this rejection is respectfully requested.

In addition, none of the cited references discloses or suggests a carbon monoxide concentration of the hydrogen gas after contacting the catalyst of not larger than 1% as claimed in **new Claims 31-33**.

The rejections of **Claims 1-8 and 25** are moot in view of the cancellation of these Claims.

The rejection of Claims 11, 12, 18 and 24 under 35 U.S.C. §112, 2<sup>nd</sup> paragraph, is obviated by the amendment of these Claims.

Applicants respectfully request that the Examiner acknowledge that the references cited in the **Information Disclosure Statements**, filed in the above-identified application on **March 29, 2001, September 26, 2001, October 30, 2001 and February 28, 2003**, have been considered. For the Examiner's convenience copies of Forms PTO 1449 as filed are attached herewith.

Applicants respectfully request that the Examiner acknowledge that the references cited in the **International Search Report**, filed in the above-identified application on February 6, 2001, have been considered. A first request for consideration was filed with the above-identified application on February 6, 2001. **Applicants note that they submitted the European application (EP 0 985 635) which corresponds to JP 2000-119004, on March 29, 2001.**

The MPEP states as follows:



"The examiner will consider the documents cited in the international search report in a PCT national stage application when the Form PCT/DO/EO/903 indicates that both the international search report and the copies of the documents are present in the national stage file. In such a case, the examiner should consider the documents from the international search report and indicate by a statement in the first Office action that the information has been considered. "

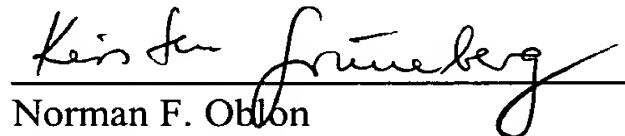
MPEP §609

The Office has acknowledged receipt of the International Search Report and the copies of the cited references on Form PCT/DO/EO/903. Copies of the International Search Report and Form PCT/DO/EO/903 are attached herewith. Accordingly, Applicants respectfully request the Office to acknowledge consideration of the above references.

Applicants submit that the present application is now in condition for allowance and early notice of such action is earnestly solicited.

Respectfully submitted,

OBLON, SPIVAK, McCLELLAND,  
MAIER & NEUSTADT, P.C.



Norman F. Oblon  
Attorney of Record  
Registration No.: 24,618

Kirsten A. Grueneberg, Ph.D.  
Registration No.: 47,297



**22850**

PHONE NO.: (703) 413-3000  
FAX NO.: (703) 413-2220  
NFO:KAG:lcd  
I:\user\KGRUN\201034US-am.wpd

**Marked-Up Copy**  
Serial No: 09/720,262  
Amendment Filed: **HEREWITH**

Claims 1-8, 14, 20 and 25. (Canceled)

---9. (Amended) A method for removing carbon monoxide [in] from a hydrogen gas, comprising:

[characterized in that the] contacting said hydrogen gas which contains carbon monoxide [is contacted] with a catalyst for a water gas shift reaction [in which] said catalyst comprising at least platinum [is] and rhenium, both supported on a metal oxide carrier.

10. (Thrice Amended) The method [for removing carbon monoxide] according to claim 9,

wherein said [characterized in that the] metal oxide carrier is selected from the group consisting of zirconia, alumina, titania, silica-magnesia, zeolite, magnesia, niobium oxide, zinc oxide and chromium oxide.

11. (Amended) A fuel cell generation system [characterized in that], comprising:  
a hydrogen gas which contains carbon monoxide [is contacted] in contact with a catalyst for a water gas shift reaction [in which catalyst] comprising at least platinum [is] and rhenium, both supported on a metal oxide carrier so as to remove carbon monoxide from the hydrogen gas, which is supplied to a fuel cell.

12. (Thrice Amended) The fuel cell generation system according to claim 11, wherein [the] said metal oxide is at least one metal oxide selected from the group consisting

of zirconia, alumina, titania, silica, silica-magnesia, zeolite, magnesia, niobium oxide, zinc oxide and chromium oxide.

13. (Amended) The method for removing carbon monoxide according to Claim 9, wherein [the supported] an amount of said platinum is [in an amount] from 0.1% to 10% by weight based on [the] a weight of the metal oxide carrier.

15. (Amended) The method [for removing carbon monoxide] according to Claim [14] 9, [wherein] wherein [the supported] an amount of said rhenium is [in an amount] from 0.1 % to 10 % by weight based on [the] a weight of the metal oxide carrier.

16. (Amended) The method [for removing carbon monoxide] according to Claim 9, wherein [the] said catalyst further comprises at least one metal selected from the group consisting of yttrium, calcium, chromium, samarium, cerium, tungsten, neodymium, praseodymium, magnesium, molybdenum and lanthanum supported on [the] said metal oxide carrier.

17. (Amended) The method [for removing carbon monoxide] according to claim 16, wherein [the supported] an amount of said metal is [in an amount] from 0.1 % to 10 % by weight based on [the] a weight of [the] said metal oxide carrier.

18. (Amended) The method [for removing carbon monoxide] according to claim 9, wherein [the] said catalyst has been subjected to [hot] water treatment at 80 to 100°C.

19. (Amended) The fuel cell generation system according to claim 11, wherein [the supported] an amount of said platinum is [in an amount] from 0.1% to 10% by weight based on [the] a weight of the metal oxide carrier.

21. (Amended) The fuel cell generation system according to claim [20] 11, wherein [the supported] an amount of said rhenium is [in an amount] from 0.1 % to 10 % by weight based on [the] a weight of said metal oxide carrier.

22. (Amended) The fuel cell generation system according to claim 11, wherein [the] said catalyst further comprises at least one metal selected from the group consisting of yttrium, calcium, chromium, samarium, cerium, tungsten, neodymium, praseodymium, magnesium, molybdenum and lanthanum supported on [the] said metal oxide carrier.

23. (Amended) The fuel cell generation system according to claim 22, wherein [the supported] an amount of said metal is [in an amount] from 0.1 % to 10 % by weight based on [the] a weight of the metal oxide carrier.

24. (Amended) The fuel cell generation system according to claim 11, wherein [the] said catalyst has been subjected to [hot] water treatment at 80 to 100°C.--

Claims 26-33. (New)